

Recent Introductions for Biological Control in Hawaii XVII

C. J. DAVIS

STATE DEPARTMENT OF AGRICULTURE
HONOLULU, HAWAII

For many years the Entomology Branch of the Hawaii Department of Agriculture has maintained a continuous program of beneficial introductions. This paper, includes a list of new introductions and additional releases for biological control in Hawaii (Table 1) made since the last listing (Davis, 1970) and gives a few notes on the status of pests and their purposely introduced enemies.

SNAIL PEST CONTROL

Achatina fulica Bowdich (giant African snail)

Giant African snail populations continued at low levels in most former high density localities on Oahu, particularly on Tantalus and Makiki Round Top Drives where sections of road in the late 50's and early 60's were slimy as a result of snails being crushed by passing motorists. During observations made on wet mornings in 1969, 1970 and 1971 not a single African snail was observed on the road throughout the entire Makiki Round Top-Tantalus Drive loop and only trace numbers of the introduced predator, *Euglandina rosea* (Ferussac) were observed.

Euglandina was first released in Makiki in 1955, and in 1957 a total of 476 was collected on the Makiki-Tantalus loop. The number on this loop peaked in 1961 when a total of 4,353 was collected. By 1962 this dropped to 851, followed by 743 in 1963 and 669 in 1964. Between 1965 and 1971, this carnivorous snail was scarce in Tantalus-Makiki and other mountainous localities. This was also supported by survey data from mountain trails in various localities.

Elsewhere, Van der Schalie (1969) reported live *Euglandina* and eggs in the Honouliuli-Palikey sectors of the Waianae Mountain Range but there have been no further sightings and it appears that this range is generally free of *Euglandina*.

A drastic *Achatina* reduction was reported for Tantalus (Davis, Proc. Hawaiian Entomol. Soc., 18 (3): 391) and Makiki Round Top Drive (*ibid* 19 (2): 201). Attempts to eradicate *Achatina* from Kona, Hawaii and from Poipu, Kauai are continuing under difficult circumstances.

Galba* (= *Lymnaea*) *viridis (Quoy and Gaimard) (liverfluke snail)

Liverfluke is one of the most important diseases of cattle in Hawaii

TABLE 1. *New Introductions and Additional Releases for Biological Control in Hawaii 1971.*
(Unless otherwise indicated, all introductions by Entomology Branch, Hawaii Department of Agriculture)

<i>Pest Needing Control</i>	<i>Organism Introduced</i>	<i>Source</i>	<i>Collector</i>	<i>Date Rel'd (1971)</i>	<i>Num-ber**</i>	<i>Release Point</i>
Snail Pests <i>Galba</i> (= <i>Lymnaea</i>) <i>viridis</i> (Quoy & Gaimard)	<i>Sepedon plumbella</i> Wiedemann (Diptera: Sciomyzidae)	Bangsue, Thailand	Harry Nakao	Aug. 9 Aug.	90 892	Kahaluu, Oahu Waimea, Kauai
	* <i>Sepedon sauteri</i> Hendel (Diptera: Sciomyzidae)	Ajime; 10 Km. North of Nagoya, Japan	Harry Nakao	Jul. 21	64	Kauai
	<i>Sepedon</i> n. sp. (Diptera: Sciomyzidae)	Ajime, Japan	Harry Nakao	Aug. 8 Aug. 24	125 90	Paauiilo, Hawaii Kailua, Hawaii
	<i>Sepedon senex</i> Wiedemann (Diptera: Sciomyzidae)	Rangsit, Thailand	Harry Nakao	Dec. 3	100	Parker Ranch, Hawaii
Insect Pests						
<i>Aspidiotus destructor</i> Signoret (coconut scale)	* <i>Pseudoscyrnus anomolus</i> Chapin (Coleoptera: Coccinellidae)	Agana, Guam	Dr. Muniappan	Feb. 9	75	Hawaii Kai, Oahu
	* <i>Chilocorus nigritus</i> F. (Coleoptera: Coccinellidae)	Agana, Guam	Harry Nakao	Aug. 26	35	Hawaii Kai Oahu
Aphids and Scales	<i>Verania discolor</i> Fab. (Coleoptera: Coccinellidae)	Taipei, Taiwan	Harry Nakao	Jul. 20	10	Punahou School, Oahu
	<i>Menochilus sexmaculatus</i> (F.)	Potzu, Taiwan	Harry Nakao	Jul. 20 Sept. 13	3 50	Punahou School, Oahu Ewa Plantation, Oahu
<i>Papilio xuthus</i> (L.) (citrus swallowtail)	<i>Exorista sorbillans</i> (Wiedemann)	Pak Chong, Thailand	Harry Nakao	Aug. 26	33	Ewa Beach, Oahu
<i>Plutella xylostella</i> (Linnaeus) (diamondback moth)	<i>Apanteles vestalis</i> Haliday	Trinidad, West Indies	Dr. M. Yaseen	Oct. Oct.	100 100	Poipu, Kauai Upper Kula, Maui
<i>Heliothis zea</i> (Boddie) (corn ear worm)	<i>Eucelatoria</i> sp.	Tucson, Arizona	Dr. D. E. Bryan	Nov. 10 Nov. 18 Nov. 11 Nov. 16	400 300 350 200	Kilauea, Kauai Kaaawa, Oahu Kihei, Maui Hoolehua, Kaunakakai, Molokai

*Previously introduced.

**Applies to initial release only.

and losses incurred by the ranching industry are estimated at \$321,000. The intermediate host of liverfluke is *G. viridis*.

To augment *Sepedon macropus* Walker and *S. sauteri* Hendel in the biological control of the liverfluke snail, the following sciomyzids were introduced from Southeast Asia in 1971: *S. plumbella* Wiedemann. *Sepedon* n. sp. and *S. senex* Wiedemann. These have been released on all major islands but no recoveries have been made to date.

Two other sciomyzid species, **S. macropus* Walker from Venezuela, South America and *S. ferruginosus* Wiedemann from Chiangmai, Thailand were also imported but their propagation was unsuccessful.

WEED PEST CONTROL

Lantana camara var. **aculeata** L. Moldenke (lantana)

On the island of Hawaii, a marked buildup of the lantana cerambycid, *Plagiohammus spinipennis* Thomson, was observed at Papaloa and Kahauloa, Kona in February, 1971. Girdling damage was conspicuous and well dispersed.

Two other beetles, *Uroplata girardi* Pic and *Octotoma scabripennis* (Guerin), continued their high level of activity in Kona and Ka'u districts of Hawaii, causing considerable foliar damage in some localities. In Kona, 70-80 percent of the foliage was attacked with as many as five mines per leaf.

Heavy numbers of eggs, nymphs and adults of *Leptobyrsa decora* Drake were noted in lantana infested pasture land in Pulehu, Maui in April, 1971. This tingid is now well established in some localities on Maui. Field colonies were started in late December, 1970.

Hypericum perforatum L. (Klamath weed)

There were no significant developments with regard to biological control of Klamath weed, *H. perforatum*, on Mt. Hualalai, Hawaii. The gall midge, *Zeuxidiplosis giardi* (Kieffer) was active year round and is without doubt responsible for the spectacular reduction of Klamath weed density. *Chrysolina hyperici* (Forster) was not as abundant on *Hypericum degeneri* Fosberg as noted previously (1970) in the Kilauea Forest Reserve, Kilauea, Hawaii.

Clidemia hirta (L.) (Koster's curse)

This weed continued to be of major concern to foresters and conservationists and there was an unconfirmed report of its presence in the Waianae Mountain Range, Oahu. The purposely introduced pyralid, *Blepharomastix ebulealis* Guenee has been liberated for its control but has not been recovered to date.

Tribulus cistoides (puncture vine (nohu))

Colonies of *Tribulus* on Maui were reduced considerably by the stem

*imported to introduce a different strain of a previously introduced species.

weevil, *Microlarinus lypriformis* (Wollaston). Sandy Beach areas of Kihei, Maui are nearly free of puncture vine and heavy weed mortality was noted at Waikapu, Maalaea and Puunene. On Hawaii, small colonies were completely destroyed at South Point. These observations were made in May, 1971, following the release of *M. lypriformis* on 12 March 1971.

INSECT PEST CONTROL

Rhabdoscelus obscurus (Boisduval) (New Guinea sugarcane weevil)

There were no significant developments with regard to the liberation of strains of *Lixophaga sphenophori* (Villeneuve) on the major Hawaiian islands. Releases were concentrated on Maui and Hawaii, with the major releases being made on Hawaii during the latter part of the year.

Melanagromyza phaseoli (Tryon) (bean fly)

Results of studies on Kauai and Maui showed encouraging parasitism by the introduced parasites, *Opius phaseoli* Fischer and *O. importatus* Fischer. On Kauai, sampling of bean fly infested material from several localities was 100 percent parasitized. On Maui, parasitism ranged from 25 to 83 percent.

Schistocerca vaga (Scudder) (vagrant grasshopper)

Unfortunately, the breeding stock of *Blaesoxipha filipjevi* Rohdendorf, obtained through a cooperative arrangement with the Commonwealth Institute of Biological Control, Kawanda Research Station, East Africa was lost. Although a number of releases were made, no recoveries have been made to date. Field placements of *Schistocerca*, however, did yield the sarcophagid, *Helicobia morionella* (Aldrich).

Aspidiotus destructor Signoret (coconut scale)

Despite releases of the coccinellids, *Pseudoscymnus anomolus* Chapin and *Chilocorus nigritus* (F.) from Guam and the previously released *Cryptognatha nodiceps* Marshall from Fiji and Trinidad, West Indies, there have been no recoveries of these beneficial introductions.

Up to the present time, the coconut scale, *A. destructor*, has not been reported from the neighbor islands.

ACKNOWLEDGMENT

The assistance of our foreign and domestic collaborators and our immediate staff is greatly acknowledged. Determinations by the Insect Identification and Parasite Introduction Section of the United States Department of Agriculture, Commonwealth Institute of Entomology and others were invaluable.

LITERATURE CITED

- Van der Schalie, H. 1969. Man Meddles with Nature—Hawaiian Style Biologist, Vol. 51(4): 136–146.